WHAT IS CLAIMED IS:

1. A centrifugal separator, comprising:

centrifugal rotors (10-1, 10-2, 80-1, 80-2), with symmetric rotation axes, having single sample separation chambers (2, 15, 70) in them for centrifuging samples contained in sample solutions and upper openings passing through to said sample separation chambers in the upper parts,

members of frameworks capable of being coupled to said openings (100),

rotation-driving means (20) for rotating said centrifugal rotors, assuming that the direction of said symmetric rotation axis is the first direction, by rotating said members of frameworks around a rotation axis in said first direction,

wherein provided that two directions intersecting with said first direction are the second direction and the third direction, respectively, the length of said sample separation chamber in said third direction is larger than the length of said sample separation chamber in said second direction.

2. A centrifugal separator according to claim 1, wherein said members of frameworks are engaged with said upper openings to seal said upper openings by said members.

3. A centrifugal separator according to claim 1, wherein sample solutions are injected into said sample separation chambers from said upper openings.

4. A centrifugal separator according to claim 1, wherein said sample separation chambers have concave portions with two symmetric planes intersecting with one another, including said symmetric rotation axes.

5. A centrifugal separator according to claim 1, wherein portions, to which the largest centrifugal acceleration generated by rotation of said centrifugal rotors is applied, have the smallest areas.

6. A centrifugal separator according to claim 1, wherein lower parts of said centrifugal rotors have lower openings (16) passing through to said sample separation chambers.

7. A centrifugal separation according to claim 1, wherein said centrifugal rotors consist of the upper members of frameworks (110-1, 110-2, 110-3) and the lower members of frameworks (120-1, 120-2, 120-3) and said upper members and said lower members are fitted one another.

8. A centrifugal separator, comprising:

centrifugal rotors (10-1, 10-2, 80-1, 80-2), with symmetric rotation axes, having single sample separation chambers (2, 15, 70) in them for centrifuging samples contained in sample solutions and upper openings (3) passing through to said sample separation chambers in the upper parts,

members of frameworks capable of being coupled to said openings (100),

rotation-driving means (20) for rotating said

centrifugal rotors, assuming that said symmetric rotation axis is axis Z, by rotating said members of frameworks around said axis Z,

wherein provided that a direction, in which the distance between the ends of said sample separation chamber is the largest in the direction normal to said axis Z, is axis Y, a direction intersecting with said axis Z and said axis Y is axis X, with respect to a cross sectional areas of said sample separation chamber in a plane parallel to a ZX plane, said cross sectional area at a distance far from said axis Z is smaller than said cross sectional area at a distance near axis Z.

9. A centrifugal separator according to claim 8, wherein said members of frameworks are engaged with said upper openings to seal said upper openings by said members.

10. A centrifugal separator according to claim 8, wherein sample solutions are injected into said sample separation chambers from said upper openings.

11. A centrifugal separator according to claim 8, wherein said sample separation chambers have concave portions with two symmetric planes intersecting with one another, including said axis Z.

12. A centrifugal separator according to claim 8, wherein the portions, to which the largest centrifugal acceleration generated by rotation of said centrifugal rotors is applied, have the smallest areas.

13. A centrifugal separator according to claim 8

wherein the lower parts of said centrifugal rotors have the lower openings (16) passing through to said sample separation chambers.

14. A centrifugal separation according to claim 8, wherein said centrifugal rotors consist of the upper members of frameworks (110-1, 110-2, 110-3) and the lower members of frameworks (120-1, 120-2, 120-3) and said upper members and said lower members are fitted one another.

15. A centrifugal separator, comprising:

centrifugal rotors (10-2, 80-2), with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging samples contained in sample solutions the upper openings (3) passing through to said sample separation chambers in the upper parts and the lower openings passing through to said sample separation chambers,

rotation driving means (20) for rotating said centrifugal rotors, assuming that said symmetric rotation axes are rotation axes, by rotating said members of frameworks around said rotation axes, and

solution holding vessels (12, 150), fixed in said sample separation chambers, having concave portions (13, 160) for holding said sample solutions injected from said upper openings,

16. A centrifugal separator according to claim 15, wherein said centrifugal rotors consist of the upper members of frameworks (110-2) and the lower members of

frameworks and said upper members and said lower members are fitted one another.

17. A centrifugal separator, comprising:

centrifugal rotors (10-2, 80-2), with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging samples contained in sample solutions the upper openings (3) passing through to said sample separation chambers in the upper parts and the lower openings (16) passing through to said sample separation chambers in the lower parts,

rotation driving means (20), assuming that said symmetric rotation axis is axis Z, for rotating said centrifugal rotors around said axis Z, and

solution holding vessels (12, 150), fixed in said sample separation chambers, having concave portions (13, 160) for holding said sample solutions injected from said upper openings,

wherein provided that the direction, in which the distance between the ends of said sample separation chamber is the largest in the direction normal to said axis Z, is axis Y, the direction intersecting with said axis Z and said axis Y is axis X, said longitudinal direction corresponds to said axis Y.

18. A centrifugal separator according to claim 17, wherein said centrifugal rotors consist of the upper members of frameworks (110-2) and the lower members of frameworks (120-2) and said upper members and said lower members are fitted one another.

19. A centrifugal separator, comprising:

centrifugal rotors (10-2, 80-2), with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging samples contained in sample solutions, the upper openings (3) passing through to said sample separation chambers in the upper parts and the lower openings (16) passing through to said sample separation chambers in the lower parts,

members of frameworks capable of being coupled to said openings (100),

rotation driving means (20) for rotating said centrifugal rotors, assuming that the direction of said symmetric rotation axis is the first direction, by rotating said members of frameworks around a rotation axis in said first direction, and

solution holding vessels (12, 150), fixed in said sample separation chambers, having concave portions (13, 160) for holding said sample solutions injected from said upper openings,

wherein provided that two directions intersecting with said first direction are the second direction and the third direction, respectively, the length of said sample separation chamber in said third direction is larger than the length of said sample separation chamber in said second direction.

20. A centrifugal separator according to claim 19, wherein said members of frameworks and said upper openings are engaged with one another to seal said

upper openings by said members of frameworks.

21. A centrifugal separator according to claim 19, wherein said sample separation chambers have the concave portions with two symmetric planes intersecting one another, including said symmetric rotation axes.

22. A centrifugal separator according to claim 19, wherein the portions, to which the largest centrifugal acceleration generated by rotation of said centrifugal rotors is applied, have the smallest cross sectional areas.

23. A centrifugal separator according to claim 19, wherein means (17, 18; 130, 131) rotatably supports said centrifugal rotors from lower side.

24. A centrifugal separator according to claim 19, wherein said centrifugal rotors consist of the upper members of frameworks (110-2) and the lower members of frameworks (120-2) and said upper members and said lower members are fitted one another.

25. A centrifugal separator, comprising:

centrifugal rotors (10-2, 80-2), with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging samples contained in sample solutions, the upper openings (3) passing through to said sample separation chambers in the upper parts and the lower openings (16) passing through to said sample separation chambers in the lower parts,

members capable being coupled to said openings (100),

rotation driving means (20), assuming that said symmetric rotation axis is axis Z, for rotating said centrifugal rotors by rotating said members of frameworks around said axis Z, and

solution holding vessels (12, 150), fixed in said sample separation chambers, having concave portions (13, 160) for holding said sample solutions injected from said upper openings,

wherein provided that a direction, in which the distance between the ends of said sample separation chamber is the largest in the direction normal to said axis Z, is axis Y, a direction intersecting with said axis Z and said axis Y is axis X, with respect to a cross sectional areas of said sample separation chamber in a plane parallel to a ZX plane, said cross sectional area at a distance far from said axis Z is smaller than said cross sectional area at a distance near axis Z.

26. A centrifugal separator according to claim 25, wherein said members of frameworks and said upper openings are engaged with one another to seal said upper openings by said members of frameworks.

27. A centrifugal separator according to claim 25, wherein said sample separation chambers have the concave portions with two symmetric planes intersecting one another, including said symmetric rotation axes.

28. A centrifugal separator according to claim 25, wherein the portions, to which the largest centrifugal acceleration generated by rotation of said centrifugal

rotors is applied, have the smallest cross sectional areas.

29. A centrifugal separator according to claim 25, wherein means (17, 18; 130, 131) rotatably supports said centrifugal rotors from lower side.

30. A centrifugal separator according to claim 25, wherein said centrifugal rotors consist of the upper members of frameworks (110-2) and the lower members of frameworks (120-2) and said upper members and said lower members are fitted one another.

31. A sample preparation device, comprising:

centrifugal rotors (210, 501), with symmetric rotation axes, having single sample separation chambers (2, 15, 70) in them for centrifuging samples contained in sample solutions and the upper openings (3) passing through to said sample separation chambers in the upper parts,

multiple rotation driving means (211, 502), assuming that said symmetric rotation axes are rotation axes, for rotating said centrifugal rotors around said rotation axes, and

a control means for driving said rotation-driving means independently.

32. A sample preparation device according to claim 31, wherein said control means control both injection of said sample solutions into said sample separation chambers of said centrifugal rotors and recovery of said samples from said sample separation chambers of

said centrifugal rotors for each of said centrifugal rotors.

33. A sample preparation device according to claim 31, wherein said centrifugal rotors are disposed at transport devices (40, 201) moving on loop-shape trajectories.

34. A sample preparation device according to claim 31, wherein said centrifugal rotors are disposed at transport devices (40, 201) moving on loop-shape trajectories and at given intervals, where said transport devices move, said centrifugal rotors are rotated for centrifuging said sample solutions.

35. A sample preparation device according to claim 31, wherein said centrifugal rotors are disposed at said transport devices moving on circular trajectories.

36. A sample preparation device according to claim 31, wherein said centrifugal rotors are disposed at transport devices (40, 201) moving on circular trajectories and at given intervals, where said transport devices move, said centrifugal rotors are rotated for centrifuging said sample solutions.

37. A sample preparation device, comprising:

centrifugal rotors (210, 501), with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging samples contained in sample solutions, the upper openings (3) passing through to said sample separation chambers in the upper parts and the lower openings (16) passing through to

said sample preparation chambers,

solution holding vessels (12, 150) having concave portions (13, 160) for holding said sample solutions injected from said upper openings,

multiple rotation driving means (211, 502) for rotating said centrifugal rotors, and

a control means for driving said multiple rotation driving means independently.

38. A sample preparation device according to claim 37, wherein said control means control both injection of said sample solutions into said sample separation chambers of said centrifugal rotors and recovery of said samples from said sample separation chambers of said centrifugal rotors for each of said centrifugal rotors.

39. A sample preparation device according to claim 37, wherein said centrifugal rotors are disposed at transport devices (40, 201) moving on loop-shape trajectories.

40. A sample preparation device according to claim 37, wherein said centrifugal rotors are disposed at transport devices (40, 201) moving on loop-shape trajectories and at given intervals, where said transport devices move, said centrifugal rotors are rotated for centrifuging said sample solutions.

41. A sample preparation device according to claim 37, wherein said centrifugal rotors are disposed at said transport devices (40, 201) moving on circular

trajectories.

42. A sample preparation device according to claim 37, wherein said centrifugal rotors are disposed at transport devices (40, 201) moving on circular trajectories and at given intervals, where said transport devices move, said centrifugal rotors are rotated for centrifuging said sample solutions.

43. A sample preparation method using multiple centrifugal rotors (210, 501), with symmetric rotation axes for two rotations, having single sample separation chambers (2, 15, 70) in them for centrifuging the samples contained in the sample solutions and the upper openings (3) passing through to said sample separation chambers comprising;

(1) a process for injecting said sample solutions into said sample separation chambers of said centrifugal rotors, (2) a process for moving said centrifugal rotors on the loop-shape trajectory, (3) a process for centrifuging said sample solutions, assuming that said symmetric rotation axes are the rotation axes, by rotating said centrifugal rotors around said rotation axes, and (4) a process for recovering said samples obtained by centrifugation from said sample separation chambers of said centrifugal rotors.

44. A sample preparation method using multiple centrifugal rotors (210, 501), with symmetric rotation axes for two rotations, having single sample separation chambers (2, 15, 70) in them for centrifuging the

samples contained in the sample solutions and the upper openings (3) passing through to said sample separation chambers comprising;

(1) a process for injecting said sample solutions into said sample separation chambers of said centrifugal rotors, (2) a process for moving said centrifugal rotors on the loop-shape trajectory, (3) a process for centrifuging said sample solutions to produce said sample precipitates, assuming that said symmetric rotation axes are the rotation axes, by rotating said centrifugal rotors around said rotation axes independently, (4) a process for discharging the supernatant liquid obtained by centrifugation from said sample separation chambers, (5) a process for cleaning away said residual precipitates deposited in said sample separation chambers of said centrifugal rotors, (6) a process for injecting solvents into said sample separation chambers of said centrifugal rotors, rotating independently said centrifugal rotors, and dissolving said precipitates into said solvent, and (7) a process for recovering said the solvent containing said dissolved precipitates from said sample separation chambers of said centrifugal rotors into the recovery vessels.

45. A sample preparation method using multiple centrifugal rotors (210, 501), with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging the samples contained in the

sample solutions, the upper openings (3) passing through to said sample separation chambers, and the lower openings (16) passing through to said sample separation chambers, comprising;

(1) a process for injecting said sample solutions into solution holding vessels (12, 150), fixed in said sample separation chambers of said centrifugal rotors, having concave portions (13, 160) in said sample separation chambers of said centrifugal rotors, (2) a process for moving said centrifugal rotors on the loop-shape trajectory, (3) a process for centrifuging said sample solutions, assuming that said symmetric rotation axes are the rotation axes, by rotating said centrifugal rotors around said rotation axes independently, (4) a process for recovering said samples obtained by centrifugation from said sample separation chambers of said centrifugal rotors.

46. A sample preparation method using multiple centrifugal rotors (210, 501), with symmetric rotation axes for two rotations, having single sample separation chambers (15, 70) in them for centrifuging the samples contained in the sample solutions, the upper openings (3) passing through to said sample separation chambers in the upper parts, and the lower openings (16) passing through to said sample separation chambers in the lower parts, comprising;

(1) a process for injecting said sample solutions into solution holding vessels (12, 150), fixed in said

sample separation chambers of said centrifugal rotors, having concave portions (13, 160), (2) a process for moving said centrifugal rotors on the loop-shape trajectory, (3) a process for centrifuging said sample solutions to produce said sample precipitates, assuming that said symmetric rotation axes are the rotation axes, by rotating said centrifugal rotors around said rotation axes independently, (4) a process for discharging the supernatant liquid obtained by centrifugation from said sample separation chambers, (5) a process for cleaning away said residual precipitates deposited in said sample separation chambers of said centrifugal rotors, (6) a process for injecting solvents into said sample separation chambers of said centrifugal rotors, rotating independently said centrifugal rotors, and dissolving said precipitates into said solvent, and (7) a process for recovering said the solvent containing said dissolved precipitates from said lower openings in said sample separation chambers of said centrifugal rotors into the recovery vessels.

47. Centrifugal rotors, with symmetric rotation axes, having single sample separation chambers (2, 15, 70) in them for centrifuging the samples contained in the sample solutions and the upper openings (3) passing through to said sample separation chambers in the upper parts,

wherein assuming that the direction of said

symmetric rotation axis is the first direction and two directions intersecting with said first direction are the second and third directions, the length of said sample preparation chamber in said third direction is longer than the length of said sample preparation chamber in said second direction.

48. Centrifugal rotors, with symmetric rotation axes, having single sample separation chambers (2, 15, 70) in them for centrifuging samples contained in sample solutions and upper openings (3) passing through to said sample separation chambers in the upper parts,

wherein provided that said symmetric rotation axis is axis Z, a direction, in which the distance between the ends of said sample separation chamber is the largest in the direction normal to said axis Z, is axis Y, a direction intersecting with said axis Z and said axis Y is axis X, with respect to a cross sectional areas of said sample separation chamber in a plane parallel to a ZX plane, said cross sectional area at a distance far from said axis Z is smaller than said cross sectional area at a distance near axis Z.

49. Centrifugal rotors, with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging samples contained in sample solutions, the upper openings (3) passing through to said sample separation chambers in the upper parts, the lower openings (16) passing through to said sample separation chambers in the lower parts, and solution

holding vessels (12, 150), fixed in said sample separation chambers, having concave portions (13, 160) for holding said sample solutions injected from said upper openings.

50. Centrifugal rotors, with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging samples contained in sample solutions, the upper openings (3) passing through to said sample separation chambers in the upper parts, the lower openings (16) passing through to said sample separation chambers in the lower parts, and solution holding vessels (12, 150), fixed in said sample separation chambers, having concave portions (13, 160) for holding said sample solutions injected from said upper openings,

wherein assuming that the direction, in which the distance between the ends of said sample separation chamber in the direction normal to axis Z is the largest, is axis Y, and the direction intersecting with said axis Z and said axis Y is axis X, respectively, the longitudinal direction of said sample separation vessel corresponds to said axis Y.

51. Centrifugal rotors, with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging samples contained in sample solutions, the upper openings (3) passing through to said sample separation chambers in the upper parts, the lower openings (16) passing through to said sample

separation chambers in the lower parts, and solution holding vessels (12, 150), fixed in said sample separation chambers, having concave portions (13, 160) for holding said sample solutions injected from said upper openings,

wherein assuming that two directions intersecting with said first direction are the second and third directions, the length of said sample preparation chamber in said third direction is longer than the length of said sample preparation chamber in said second direction.

52. Centrifugal rotors, with symmetric rotation axes, having single sample separation chambers (15, 70) in them for centrifuging samples contained in sample solutions, the upper openings (3) passing through to said sample separation chambers in the upper parts, the lower openings (16) passing through to said sample separation chambers in the lower parts, and solution holding vessels (12, 150), fixed in said sample separation chambers, having concave portions (13, 160) for holding said sample solutions injected from said upper openings,

wherein provided that a direction, in which the distance between the ends of said sample separation chamber is the largest in the direction normal to said axis Z, is axis Y, and a direction intersecting with said axis Z and said axis Y is axis X, with respect to a cross sectional areas of said sample separation

chamber in a plane parallel to a ZX plane, said cross sectional area at a distance far from said axis Z is smaller than said cross sectional area at a distance near axis Z.

5